



Conservative Management of Emphysematous Pyelonephritis in Transplantation

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ABSTRACT

Emphysematous pyelonephritis is believed to be one of the most important urologic emergency conditions characterized by an acute and severe necrotizing parenchymal and perirenal infection caused by gas-forming uropathogens. Predisposing risk factors include diabetes, immunosuppression conditions, urinary tract obstruction associated with urinary calculi or papillary necrosis, and significant renal functional damage. The overall mortality rate has been reported to be 19 to 43 percent and few cases in kidney allograft transplantation have been reported. We report a 66-year-old man with diabetes and end-stage renal disease (ESRD) received deceased renal transplant. Two months after transplantation, he was admitted in hospital with complain of reduced urine output, increased serum creatinine (Cr) level, fever, and abdominal pain. The patient was treated with 250 mg intravenous imipenem and 1 g intravenous vancomycin per 12 hours; and underwent hemodialysis every other day for one week. An ultrasound-guided percutaneous nephrostomy was accomplished; he considerably responded clinically and radiologically and the transplanted kidney was saved.

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Introduction

Emphysematous pyelonephritis (EPN) is a severe and lethal necrotizing infection of the renal parenchyma, which can cause demolish kidney and has a high mortality rate. Different gas-forming pathogens such as *Escherichia coli*,

Klebsiella, *Proteus mirabilis*, *Clostridium*, *Candida*, *Aspergillus*, *Cryptococcus*, and *Amoeba* can cause this infection (1). The first survey of renal infection with gas-forming bacteria was reported in 1898 by Kelly and MacCallum (2).

Predisposing factors for disease include

diabetes, immunosuppression conditions, urinary tract obstruction associated with urinary stones or papillary necrosis, and significant decrease in renal function (3). Patients with juvenile diabetes are free from disease. Women are affected more often than men. The usual clinical presentation signs and symptoms are severe, acute pyelonephritis; although in some patients a chronic infection persists before the acute episode. All patients usually depict the classic triad of fever, vomiting, and flank pain (4). The diagnosis is confirmed radiologically as tissue gas (air pattern) that is distributed in the parenchyma of kidney and neighborhood tissues around kidney (3). Computed tomography (CT) without contrast is the choice imaging procedure in diagnosis and defining the extent of the emphysematous process and kind of management and follow-up (5).

Emphysematous pyelonephritis is considered as a urologic surgical emergency. Risk factors associated with higher mortality include conservative treatment, both renal disease, type one emphysematous pyelonephritis, thrombocytopenia (low platelet count), systolic blood pressure less than 90 mmHg, increase in serum creatinine (Cr) greater than 230 $\mu\text{mol/l}$ (2.5 mg/dl), and consciousness impairment. Diabetes mellitus is not a poor prognostic factor (6). Most patients are septic, and fluid resuscitation and broad-spectrum antimicrobial therapy are crucial and primary treatment.

If the kidney is functioning, medical therapy can be considered (7). If the affected kidney is nonfunctioning and not obstructed, nephrectomy should be performed because medical treatment alone in this condition is usually hazardous and fatal. If a kidney is obstructed, catheter drainage must be considered (8). If the patient's condition improves, nephrectomy may be deferred until a complete urologic evaluation.

Although there are isolated case reports of conservation of renal function after medical therapy combined with relief of obstruction, most patients require nephrectomy (9). While

emphysematous pyelonephritis is well described in the native kidney in literature, according to our knowledge, only 20 cases have been reported in the transplanted kidney (9). Renal transplantation is the preferred treatment for patients with end-stage renal disease (ESRD) (10).

In recent years, with the introduction of new immunosuppressive drugs, graft and patient survival have improved, but systemic infections are still common complications that can cause morbidity and mortality in a renal-transplant recipient. Herein, we report a case of emphysematous pyelonephritis in a renal transplant recipient.

Case Report

A 66-year-old man with diabetes and ESRD received a deceased renal transplant. Two months after the transplantation (one month after double J catheter removal), he was admitted because of reduced urine output and rise in serum creatinine level; the patient was evaluated in emergency ward. On physical examination, he was toxic and febrile, though hemodynamically stable. Abdominal examination revealed mild tenderness in the right iliac fossa (site of transplanted kidney). At the time of presentation, he was taking cyclosporine and mycophenolate mofetil (MMF) twice a day, and 50 mg/day prednisolone.

Patient's lab findings included white blood cell (WBC) count of 11×10^3 , hemoglobin level of 7.6 g/dl, creatinine level of 6 mg/dl, blood sugar level of 293 mg/dl, and a platelet count of $305 \times 10^3/\mu\text{l}$. Urinalysis revealed many red cells and WBC and urine culture was negative.

Ultrasonography of the abdomen revealed small and atrophic native kidneys, a small stone in left kidney, and a large air-fluid level in the right iliac fossa extending to the abdominal wall. The transplant kidney could not be delineated. Non-contrast computed tomography (CT) of the abdomen demonstrated extensive retroperitoneal air around the graft kidney which extended to

perirenal tissues in right lower quadrant (RLQ) and pelvic area (Figures 1 and 2).



Figure 1. Computed tomography (CT) scan of the abdomen and pelvis showing an edematous transplanted kidney with air in the intraparenchymal space

The patient was treated with 250 mg intravenous imipenem and 1 g intravenous vancomycin per 12 hours and underwent hemodialysis every other day for one week. An ultrasound-guided percutaneous nephrostomy was accomplished and fortunately, he considerably responded clinically and radiologically.



Figure 2. Computed tomography (CT) scan of pelvis showing air bubbles in the pelvic

In the following serial non-contrast CT scan, amount of the gas decrease dramatically. Antibiotic therapy continued for 21 days and immunosuppression therapy was modified.

Urine cultures were taken weekly for 4 weeks and 3 months later, without positive result. His serum creatinine was stable at 1.6 mg/dl, Urine cultures were negative and performed graft ultrasound and CT scan did not show residual abscesses and gas (Figures 3 and 4) and patient was dialysis-free.



Figure 3. Computed tomography (CT) scan of the abdomen and pelvis showing nephrostomy tube derange transplanted kidney

Discussion

Emphysematous pyelonephritis is believed to be one of the most lethal and extremely scarce diseases in kidney allograft (9). It is an acute destructive infection due to a gas-forming pathogens (1).

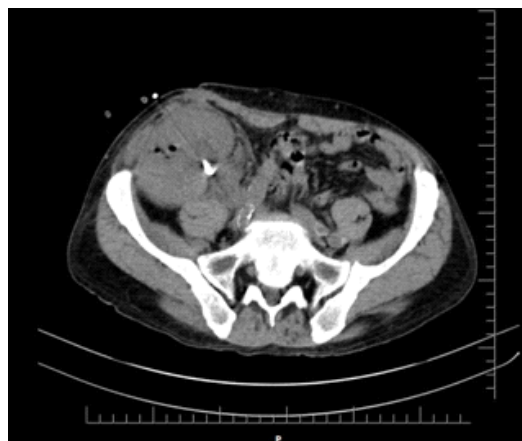


Figure 4. Computed tomography (CT) scan of the abdomen showing significant decrease in amount of air in transplant kidney after percutaneous nephrostomy

Patients with high tissue glucose levels (diabetes), impaired tissue perfusion, and immunocompromisation are more likely to suffer a renal parenchyma and perirenal tissue infection. Tissue necrosis is observed and could lead to a life-threatening situation. Emphysematous pyelonephritis should be suspected in immunosuppressed patients or in patients with abnormal immune response, inadequate tissue perfusion, or poorly controlled diabetes (11).

Women are more likely to suffer a emphysematous pyelonephritis; although in renal transplantation, men are more likely to suffer (8). The typical presentation of emphysematous pyelonephritis includes fever in 80% of cases with flank or abdominal or back pain in 70%, and acute renal failure or defined septic shock appear in one-third of cases; although in transplanted situation, this sign and symptoms are not clear (4).

Urine test and culture and blood tests usually show leukocytosis, increased c-reactive protein, and pyuria; although transplanted patients may show nonspecific symptoms.

An imaging test must be considered in exact diagnosis. The first radiologic modality is ultrasonography, showing gas in renal or perinephric tissue with unclear shadowing, but the definitive diagnosis test is an abdomen CT scan without contrast (12). It allows us to estimate the extent of renal parenchymal involvement and to determine the patient's response to therapy, and to manage follow-up process.

The most controversial point of this pathological entity is its management. Early nephrectomy and broad-spectrum intravenous antibiotic therapy were the standard treatment (9). Nowadays, there is a trend to maintain a conservative treatment regimen by percutaneous techniques. A percutaneous drainage proposed in critical patients or in patients with a solitary kidney or severe chronic renal insufficiency showed a successful rate of 18 to 80 percent (7). Early nephrectomy is associated with higher mortality rates than initial conservative

treatment. A 25% mortality rate was observed in patients undergoing an emergent nephrectomy, 50% in medical management, and only 13% in percutaneous nephrostomy and medical management (8).

Imaging follow-up is mandatory and especially useful if the patient's condition worsens or deteriorates. According to references, the cause of high mortality rate of emphysematous pyelonephritis is high percentage of kidneys destruct in this disease. In high risk patients, such as those with diabetes, presenting with persistent upper urinary tract infection, especially whom that does not response to proper antibiotic treatment, the presence of a severe renal infection, such as emphysematous pyelonephritis should be considered (7-12).

CT-guided percutaneous drainage or open drainage, along with antibiotic treatment, may be a reasonable alternative to nephrectomy (13). However, emergent surgical intervention should not be postponed in patients with extensive disease or in those who do not substantially improve after appropriate medical treatment and percutaneous drainage. Base on the above-mentioned discussion, we can say that appropriate management of emphysematous pyelonephritis is dependent on patient clinical circumstance individually and conservative management is a good option in some patients.

Conflict of Interests

Authors have no conflict of interests.

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